

Quality control systems for compact disc production

CD-RW / DVD-RW

- thickness and complex refractive index monitoring for the complete layer stack

DVD

- DVD substrate thickness
- bonding layer thickness
- reflective layer thickness

CD-R

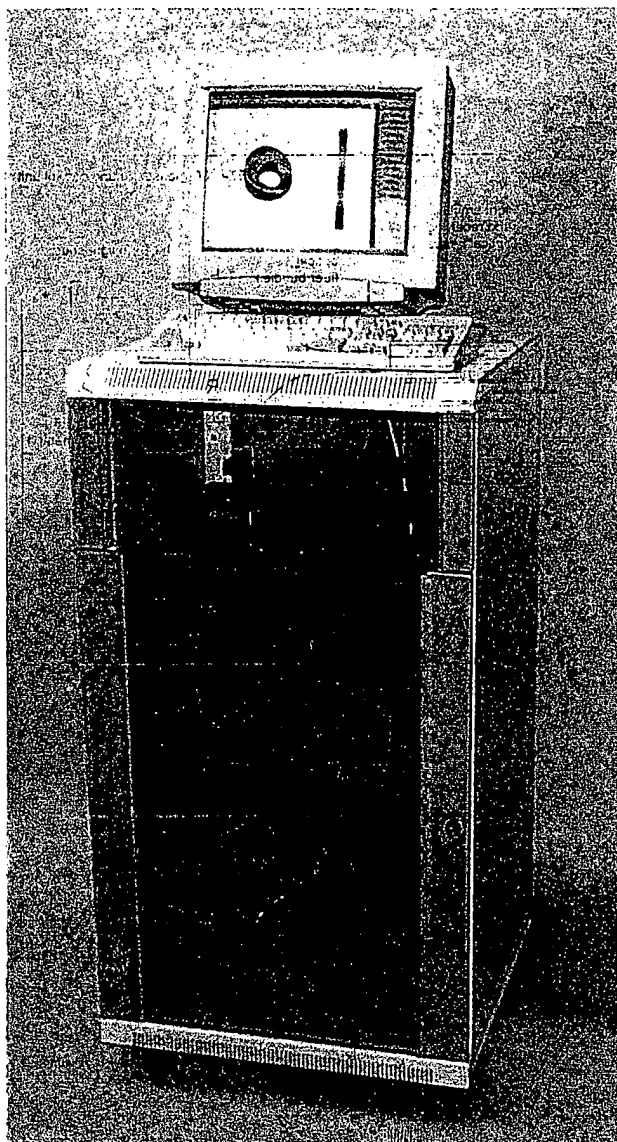
- dye-coating process time
- groove geometry in substrate and dye coated surface
- CD-R simulation software

CD

- CD protective layer thickness
- CD dishing angle
- CD birefringence



ETA - Optik



ETA-RT measuring system

The optical measurement system **ETA-RT** is a multifunctional quality control system with high accuracy of measurement to determine various process relevant parameters in modern compact disc production.

The main tasks of the **ETA-RT** system are:

- CD-RW / DVD-RW layer stack controlling
- DVD substrate, bonding and semireflective layer thickness evaluation
- CD-R dye coating process monitoring and groove geometry determination
- CD protective layer thickness, birefringence and dishing angle measurements

System setup

The **ETA-RT** measuring system is built up strictly modularly so that the user is able to adapt and extend it according to personal as well as future requirements. Depending on customers needs a later enlargement of the **ETA-RT** system can be achieved by registering additional software modules and installing additional hardware components.

The **ETA-RT** basic measuring system is available in two different hardware setups:

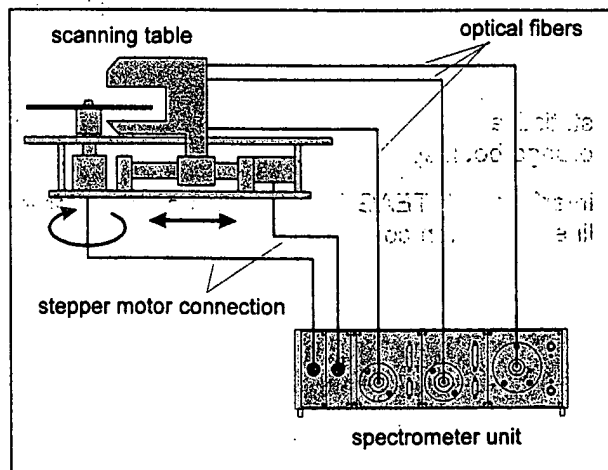
- System in 19" table rack for external PC, with spectrometer unit, measuring table and basic spectrometer software (without PC)
- System in 19" tower rack with internal PC, spectrometer unit, measuring table and installed basic spectrometer software

The measuring table consists of

- | | | |
|---|------------|------------------------------------------------------|
| 1 | ETA-MV-TRO | scan table with 1 translatory and 1 rotatory variant |
| 1 | ETA-M-R/T | R/T measuring head with various reference samples |
| 3 | ETA-F-R/R | optical fibers |

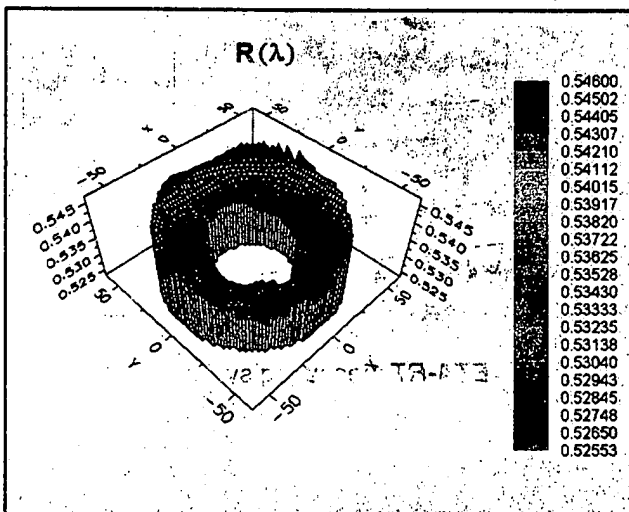
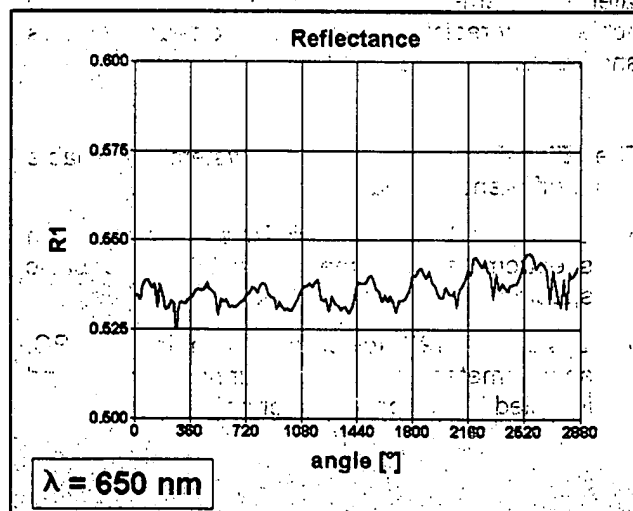
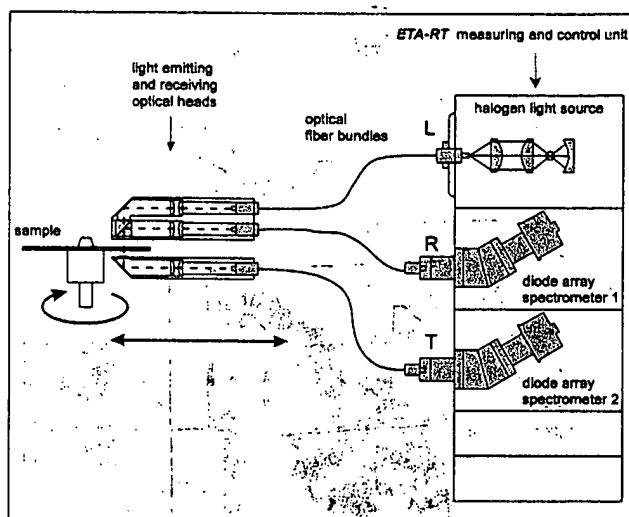
The spectrometer unit consists of

- | | | |
|---|-------------|---------------------------|
| 2 | ETA-CS-D256 | diode line spectrometers |
| 1 | ETA-HL-35 | 35 W halogen light source |
| 2 | ETA-SD-R/W | stepper-motor drives |
| 2 | ETA-MC-IO | microcontroller modules |
| 1 | ETA-P-35 | 35 W power supply |

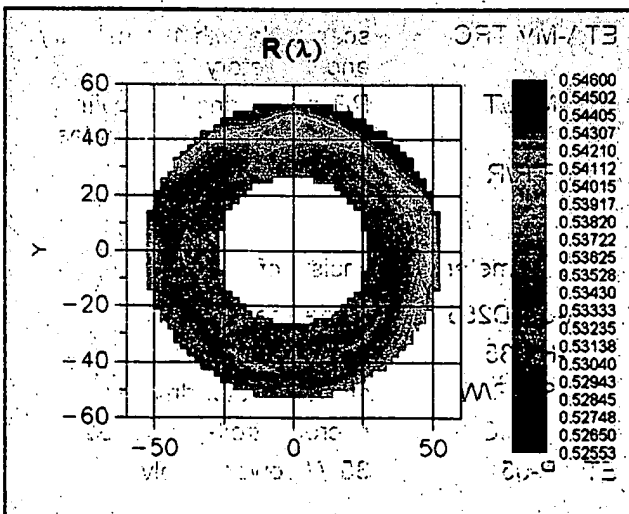


Principle of measurement

- high resolution spectral reflectance (R) and transmittance (T) measurement
- automatic referencing
- measuring rate 100 full spectra / sec
- user defined measuring and reference wavelengths (range: 450 ... 1000 nm)
- computer controlled scanning table (angular and radial position) adapted to CD-production for complete disc scanning
- scanning rate 3 Hz
- graphical measurement representation (2D, 3D and false color graphs)
- application specific software modules for CD-RW, DVD-RW stack control and DVD, CD-R etc. thickness determination



- statistical data evaluation according to red/orange book specifications
- interface to STEAG HamaTech machines for in-line production control



Data evaluation software modules

Module	Parameter		Resolution
ETA-RT basic software	R(λ)	Reflectance	0.1 %
	T(λ)	Transmittance	0.1 %
	A(λ)	Absorbance	
	R(λ_1)/R(λ_2)	Ratio	

The following additional software modules are available:

Module	Parameter		used spectra	Resolution
CD-R	d, n(λ), κ (λ)	CD-R dye layer thickness and material parameters	R and T	± 1 nm
CD-R-SIM	CD-R simulation software			
CD-RW	d, n(λ), κ (λ)	phase change and buffer layer thickness and material parameters	R and T	± 0.5 nm
DVD-ML	d	semireflective layer thickness	R or T	± 0.5 nm
DVD-RW DVD-RAM	d, n(λ), κ (λ)	phase change and buffer layer thickness and material parameters	R and T	± 0.5 nm
CD30	d	CD protective layer thickness	R	± 0.1 μ m

Further extension modules requiring additional hardware components

Module	Parameter		Hardware	Resolution
DVD80	d	DVD bonding layer thickness	high resolution spectrometer (R)	± 0.1 μ m
DVD600	d	DVD substrate thickness	high resolution spectrometer (T)	± 1.0 μ m
Diffractionmeter	d, w	groove geometry (depth and width) in substrate and dye coated surface	levelingmeter	± 2.0 nm (d) ± 4.0 nm (w)
Dishing	α	radial and angular tilt	dishing sensor	$\pm 0.01^\circ$
Birefringence	b	birefringence	birefringence sensor	± 10 nm



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